

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 19457T	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/FI 2004/000461	International filing date (day/month/year) 22.07.2004	Priority date (day/month/year) 31.07.2003
International Patent Classification (IPC) or national classification and IPC C22B3/00// C22B19:00		
Applicant Outokumpu OYJ et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority. |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

Date of submission of the demand 23.05.2005	Date of completion of this report 11.11.2005
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Form PCT/IPEA/409 (cover sheet) (April 2005)

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2004/000461

Box No. I Basis of the report

1. With regard to the language, this report is based on:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1 - 13 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* 14 - 16 received by this Authority on 23 - 05 - 2005
- pages* _____ received by this Authority on _____
- ☒ the drawings:
- pages 1 - 2 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2004/000461

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>5, 8-11, 17-18</u>	YES
	Claims	<u>1-3, 6-7, 12-16, 19</u>	NO
Inventive step (IS)	Claims	<u>5, 8-11, 17-18</u>	YES
	Claims	<u>1-4, 6-7, 12-16, 19</u>	NO
Industrial applicability (IA)	Claims	<u>1-19</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Amended claims 1-19 were filed on 23 May 2005.

Documents considered to be of particular relevance:

D1 US 4168970

D2 US 4383979

D3 US 4425228

D2 and D3 have been reconsidered not to be of particular relevance.

The invention relates to the separation of cobalt in conjunction with a zinc preparation process. A part of the sludge produced in the process is recycled to the metal separation reactor in order to improve metal precipitation.

Claims 1 and 13 of the application states that the sludge produced in the metal separation process is classified based on the "surface activity" of the sludge particles.

D1 shows a classification device (e.g. figure 3, cyclone 4) in which an overflow is forwarded to a third purification stage and the underflow is sent back to the first stage (column 6, lines 31-35). It is considered that the overflow is equivalent to the worse fraction according to the application and the underflow is equivalent to the better fraction according to the application. It is also considered that the different fractions have different "surface activities", and thus the separation device (cyclone 4) can be regarded as a device that conducts a separation based on "surface activity". The underflow according to D1 also appears to have a similar purpose as the "better fraction" according to the application (e.g. D1, column 4, lines 50-55).

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V

In absence of further clarifications claims 1 and 13 are considered to lack novelty in regard to D1.

Claims 2-3, 6-7, 12-16 and 19 lack novelty in regard to D1 (citations as above). Claim 4 lacks an inventive step in regard to D1 (citations as above).

Claims 5, 8-11 and 17-18 define embodiments that implicate that the classification mentioned in independent claims 1 and 13, is performed based on the granular size of the sludge particles. The claims are novel with respect to D1.

The stated differences imply improvements in the metal separation process by affecting the properties of the sludge. The embodiments defined in claims 5, 8-11 and 17-18 are considered to involve an inventive step.

The invention as defined by claims 1-19 is considered to fulfil the criteria of industrial applicability.

CLAIMS

1. A method for processing a metal-bearing
sludge in cobalt removal that is performed in
conjunction with zinc preparation process,
5 c h a r a c t e r i s e d in that the sludge produced
in the metal separation process is classified based on
the surface activity of sludge particles into a better
and worse substance fraction, as the process is
concerned, and the worse fraction is removed from the
10 process, and the better fraction is returned to the
process.

2. The method as defined in claim 1,
c h a r a c t e r i s e d in that the metal-bearing
sludge is a product of a precipitation process.

15 3. The method as defined in claim 1 or 2,
c h a r a c t e r i s e d in that the metal-bearing
sludge is settled in a metal separation reactor prior
to the classification.

4. The method as defined in any one of claims
20 1-3, c h a r a c t e r i s e d in that the solid
matter content in the reactor is adjusted to be in the
range 10 - 200 g/l.

5. The method as defined in any one of claims
1-4, c h a r a c t e r i s e d in that the
25 classification is performed based on the granular size
of the sludge particles by dividing the sludge into a
coarser and finer fraction.

6. The method as defined in any one of claims
1-5, c h a r a c t e r i s e d in that the
30 classification is performed using a device based on
the centrifugal force.

7. The method as defined in claim 6,
c h a r a c t e r i s e d in that the classification
is performed using a hydrocyclone or a similar device.

35 8. The method as defined in any one of claims
1-7, c h a r a c t e r i s e d in that the underflow

of the classification device is a worse fraction from the standpoint of the process.

9. The method as defined in any one of claims 1-8, characterised in that the overflow of the classification device is a better fraction from the standpoint of the process.

10. The method as defined in any one of claims 1-9, characterised in that the fraction that is worse from the standpoint of the process contains mainly coarse fraction.

11. The method as defined in any one of claims 1-10, characterised in that the fraction that is better from the standpoint of the process contains mainly fine fraction.

12. The method as defined in any one of claims 1-11, characterised in that the classification is performed in batches or continuously.

13. An apparatus for processing a metal-bearing sludge in cobalt removal that is performed in conjunction with zinc preparation process including one or more metal separation reactors (11, 12), a feeding device (18) for introducing raw material into the metal separation reactor (11, 12) and a junction line (19) for removing the sludge produced in the metal separation from the reactor (11, 12), characterised in that the apparatus includes a classification device (14) which is arranged in conjunction with the pipe extending from the metal separation reactor (11, 12) and which is arranged for classifying the sludge (13) based on the surface activity of sludge particles into a better (15) and a worse (17) substance fraction, as the process is concerned, and recycling means (15) for returning the better substance fraction to the metal separation reactor (11, 12), and means for removing the worse substance fraction (17) from the reactor.

14. The apparatus as defined in claim 13,
characterised in that the classification
device (14) is placed substantially in conjunction
with the metal separation reactor (11, 12) for
5 removing the sludge settled on the bottom from the
bottom of the reactor (11, 12).

15. The apparatus as defined in claim 13 or
14, characterised in that the
classification device (14) is based on the centrifugal
10 force.

16. The apparatus as defined in claim 15,
characterised in that the classification
device (14) is a hydrocyclone or a similar device.

17. The apparatus as defined in any one of
15 claims 13-16, characterised in that the
classification device (14) is arranged to function in
such a manner that the underflow (17) of the device is
the worse fraction from the standpoint of the process.

18. The apparatus as defined in any one of
20 claims 13-17, characterised in that the
classification device (14) is arranged to function in
such a manner that the overflow (15) of the device is
the better fraction from the standpoint of the
process.

25 19. The apparatus as defined in any one of
claims 13-18, characterised in that the
classification device (14) is arranged to function in
batches or continuously.